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Positive breastfeeding experiences and facilitators in mothers of preterm and low birth weight infants: A meta-ethnographic review

Flacking, Renee, tandberg, Bente Silnes, Neila-Vilen, Hannakaisa, Jónsdóttir, Rakel B., Jonas, Wibke, Ewald, Uwe and Thomson, Gillian

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International Breastfeeding Journal

Positive breastfeeding experiences and facilitators in mothers of preterm and low birth weight infants: A meta-ethnographic review --Manuscript Draft--

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Full Title:	Positive breastfeeding experiences and facilitators in mothers of preterm and low birth weight infants: A meta-ethnographic review
Article Type:	Review
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Abstract:	<p>Background</p> <p>Most qualitative research on breastfeeding the preterm or low-birth-weight (LBW) infant has focused on negative insights; there are no comprehensive insights into how, when and why mothers experience positive breastfeeding experiences. We aimed to address this knowledge gap by exploring what characterizes and facilitates a positive breastfeeding experience in mothers of preterm and/or LBW infants.</p> <p>Methods</p> <p>A systematic review using meta-ethnographic methods was conducted. Search strategies involved a comprehensive search strategy on six bibliographic databases, citation tracking and reference checking. The analysis involved a reciprocal level of translation and a line of argument synthesis.</p> <p>Results</p> <p>Searches identified 1774 hits and 17 articles from 14 studies were included, representing the views of 697 mothers. A positive breastfeeding experience was identified as being 'attuned'. Three themes and eight sub-themes were developed to describe what characterizes attuned breastfeeding. 'Trusting the body and what it can do', concerned how attuned breastfeeding was facilitated through understanding the bodily responses and capacity and feeling comfortable with holding the infant and to breastfeed. 'Being emotionally present – in the here and now' described the importance of feeling relaxed and reassured. 'Experiencing mutual positive responses', illuminated how attunement was related to feelings of mutuality - when the mother recognises the infant's cues, responds to these signals and receives a positive response from the infant. The key factors to facilitate attuned breastfeeding were opportunities for prolonged close physical contact with the infant, positive relationships with and support from staff and peers, and being facilitated to breastfeed when the infant showed feeding cues.</p> <p>Conclusions</p> <p>This study provides new insights into what characterizes a positive breastfeeding experience and how staff can facilitate and enable mothers to achieve attuned breastfeeding. Improvements in units' design, such as for rooming-in and having prolonged skin-to-skin contact, and care provided by knowledgeable, supportive and encouraging staff and peers, are crucial. The mother's physical and emotional states and the infant's behavioural responses and physiological signals should guide the process towards positive breastfeeding practices.</p>
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2 weight infants: A meta-ethnographic review
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27 **Abstract**

28 **Background:** Most qualitative research on breastfeeding the preterm or low-birth-weight
29 (LBW) infant has focused on negative insights; there are no comprehensive insights into how,
30 when and why mothers experience positive breastfeeding experiences. We aimed to address
31 this knowledge gap by exploring what characterizes and facilitates a positive breastfeeding
32 experience in mothers of preterm and/or LBW infants.

33 **Methods:** A systematic review using meta-ethnographic methods was conducted. Search
34 strategies involved a comprehensive search strategy on six bibliographic databases, citation
35 tracking and reference checking. The analysis involved a reciprocal level of translation and a
36 line of argument synthesis.

37 **Results:** Searches identified 1774 hits and 17 articles from 14 studies were included,
38 representing the views of 697 mothers. A positive breastfeeding experience was identified as
39 being ‘attuned’. Three themes and eight sub-themes were developed to describe what
40 characterizes attuned breastfeeding. ‘*Trusting the body and what it can do*’, concerned how
41 attuned breastfeeding was facilitated through understanding the bodily responses and capacity
42 and feeling comfortable with holding the infant and to breastfeed. ‘*Being emotionally present*
43 – *in the here and now*’ described the importance of feeling relaxed and reassured.
44 ‘*Experiencing mutual positive responses*’, illuminated how attunement was related to feelings
45 of mutuality - when the mother recognises the infant’s cues, responds to these signals and
46 receives a positive response from the infant. The key factors to facilitate attuned breastfeeding
47 were opportunities for prolonged close physical contact with the infant, positive relationships
48 with and support from staff and peers, and being facilitated to breastfeed when the infant
49 showed feeding cues.

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Conclusions: This study provides new insights into what characterizes a positive breastfeeding experience and how staff can facilitate and enable mothers to achieve attuned breastfeeding. Improvements in units' design, such as for rooming-in and having prolonged skin-to-skin contact, and care provided by knowledgeable, supportive and encouraging staff and peers, are crucial. The mother's physical and emotional states and the infant's behavioural responses and physiological signals should guide the process towards positive breastfeeding practices.

Keywords: attunement, breastfeeding, breast milk, feeding, low-birth weight, mother, neonatal, NICU, parent, preterm.

Background

Over the last few decades, much attention has been paid to the intake of breast milk in preterm (< 37 gestational weeks) and low-birth-weight infants (< 2500 grams, LBW); breast milk provides nutritional, immunological, and neurological advantages compared to breast milk substitutes [1]. It has been suggested that even small changes in the prevalence of breast milk feeding may result in significant changes in health, health care costs, and economic productivity for preterm infants and their mothers [2]. Despite the overwhelming evidence of the value of breast milk for mothers and their preterm and/or LBW infants, there are wide variations in the initiation and duration rates of feeding breast milk [3-5], where preterm infants have shown to have a shorter breast milk feeding duration compared to term infants [6-8].

72 One of the major obstacles for breastfeeding (i.e. at breast) the preterm infant is the infant's
73 breastfeeding behaviour. Preterm infants' ability to breastfeed is a maturational process and
74 until the infant can be breastfed exclusively, mothers who want to breastfeed need to express
75 their breast milk by pumping. In many settings, a range of non-evidence-based guidelines and
76 care routines dictate that the infant should be of a certain gestational age when breastfeeding
77 is initiated [9] or that the infant should tolerate full oral feeds before initiating breastfeeding
78 [10]. Whereas a supportive neonatal unit context, including skin-to-skin contact, has been
79 identified to facilitate the initiation and progression of breastfeeding at lower postmenstrual
80 ages [11, 12]. Research has shown that infants maintain their physiological status when
81 breastfed as early as 27 gestational weeks and can be exclusively breastfed at 32 weeks [13].
82 Thus, demonstrating that breastfeeding can be initiated despite an early gestational age.
83 Scheduled feeding is also still mandated in policy in some units/countries, although there are
84 indications that scheduled feeding could be replaced with more individualized and appropriate
85 practices [14]. In the context of neonatal care, breastfeeding is often regarded as a productive
86 process, with a primary focus on nutrition [15]. Such a focus fails to consider breastfeeding as
87 being relational and valuable for emotional aspects such as comfort and pleasure, and can
88 relegate breastfeeding into being an instrumental task based activity that is prone to problems
89 and failure [16].

90
91 A few reviews have been conducted on parents' experiences of breast milk feeding their
92 preterm infants: parents' experiences on factors that help or hinder breast milk supply [17];
93 factors that influence breastfeeding duration [18]; and mothers' experiences with milk
94 expression and breastfeeding [19]. Most qualitative research on breast milk feeding and
95 breastfeeding the preterm infant has focused on negative insights, such as struggles with milk
96 expression, conflicting advice from health professionals, lack of privacy or inadequate support

1 97 and encouragement [20-23]. Currently there are no comprehensive insights into how, when
2 98 and why mothers experience positive breastfeeding experiences. We aimed to address this
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4 99 knowledge gap by searching the literature to identify positive indicators and enablers for
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7 100 positive breastfeeding. We considered this approach to offer benefits to understand what a
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9 101 positive breastfeeding experience is, and how to facilitate this experience, emotionally and
10
11 102 physically, for the mother and her infant. The aim of this meta-ethnographic review was
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13 103 therefore to explore what characterizes and facilitates a positive breastfeeding experience in
14
15 104 mothers of preterm and/or LBW infants.
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22 106 **Methods**

25 107 *Design*

27 108 We undertook a systematic review and used meta-ethnographic methods of Noblit and Hare to
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29 109 extract and analyse the findings [24]. A meta-ethnography is a commonly used method to
30
31 110 combine and interpret findings from different qualitative methodological approaches [25].
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33 111 During the process of this review, we adhered to the eMERGe Reporting Guidance, which
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35 112 was developed to ensure comprehensive and transparent reporting of meta-ethnographic
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37 113 research [25]. The review protocol was uploaded and published in PROSPERO [26].
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45 115 *Search strategy*

47 116 Search terms were identified using the PEO (Population; Exposure; Outcomes) structure. The
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49 117 terms were developed following scoping exercises and were agreed in collaboration with
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51 118 librarians at Karolinska Institutet, Sweden. An overview of the search string, according to the
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53 119 PEO structure, the inclusion and exclusion criteria and additional selection criteria (date of
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55 120 publication, study type and language) is presented in Table 1.
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122 (Insert Table 1)

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4 124 Any study that described mothers' experiences of breastfeeding their preterm (< 37
5 gestational weeks) or LBW (< 2500 grams) infant were included. A broad definition of
6
7 125 breastfeeding was used [27] where all methods of feeding the infant breast milk, such as the
8
9 126 breast, bottle, cup, tube (gavage), were of interest. The experience of breastfeeding could
10
11 127 relate to any time (from birth until weaning), and hence from neonatal units to at home after
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13 128 discharge. All qualitative studies were to be included, i.e. exploratory descriptive, narrative,
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15 129 case study, phenomenology, grounded theory, ethnography as well as mixed-methods studies
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17 130 that included sufficient qualitative data. The authors native language allowed for the inclusion
18
19 131 of original studies published in different languages (i.e., English, Swedish, Norwegian, and
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21 132 Finnish). Only studies published from 2008 onwards were to be included. The rationale for
22
23 133 this timeframe was based on the progression of family centred care and more neonatal units
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25 134 offering single-family rooms, systematic use of skin-to skin contact and early discharge – all
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27 135 practices that potentially affect breastfeeding in a positive way.
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39 138 A comprehensive search strategy was used on six bibliographic databases: Medline (Ovid),
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41 139 Embase, Web of Science, PsycInfo (Ovid), CINAHL(Ebsco), and Global Index Medicus.
42
43 140 Citation tracking and reference checking was also performed. Two librarians at Karolinska
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45 141 Institute University Library search consultation group undertook the database searches. All
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47 142 included papers from the searches were downloaded to an EndNote file and duplicates were
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49 143 removed.
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57 145 *Study selection and appraisal*
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146 All abstracts were screened by at least two members of the review team against
147 inclusion/exclusion criteria and papers were subsequently identified for full text review. All
148 full text reviews were divided up across all members of the review team, and each paper was
149 read in full by two reviewers. Agreements for inclusion were made by consensus, and any
150 disagreements regarding inclusion were discussed with a third reviewer. The initial database
151 searches were undertaken in October 2018, and again in June 2020.

152

153 All articles were quality appraised using the instrument developed by Walsh and Downe [28,
154 29]. The framework assesses studies against pre-defined criteria, and then allocates a score
155 from A-D: A = no, or few flaws. The study credibility, transferability, dependability and
156 confirmability are high; B = some flaws, unlikely to affect the credibility, transferability,
157 dependability and/or confirmability of the study; C = some flaws that may affect the
158 credibility, transferability, dependability and/or confirmability of the study; D = significant
159 flaws that are very likely to affect the credibility, transferability, dependability and/or
160 confirmability of the study. Only studies that scored C or higher were to be included in the
161 final analysis.

162

163 Key data were extracted into a pre-designed template that included study aims/research
164 question, methodology, sample size, participant characteristics, data collection methods, key
165 findings/themes, and the quality appraisal rating (Table 2). Each paper was assigned to a lead
166 reviewer (to extract the data) and a secondary reviewer (to check that all key issues had been
167 recorded).

168

169 *Strategy for data synthesis*

170 An inductive and interpretative meta-ethnography approach was used. This approach
171 distinguishes first, second and third order data [24, 25]. First order concerns participant
172 quotes, second order the paper authors' interpretations, and third order the review teams'
173 interpretations [24, 25]. Meta-ethnography involves identifying issues and concepts at the
174 second order level, with this data then used by the review team to generate third order
175 interpretations via mapping and organising the data into themes and associated sub themes;
176 first order quotes were also extracted and used to authenticate and illuminate the
177 interpretations. This process also involves translation whereby similarities (reciprocal) and
178 contradicting or disconfirming (refutational) data are identified. Depending on the breadth of
179 evidence identified, an overarching summary of all key issues (i.e. line of argument synthesis)
180 is produced [24, 25]. In this review, we aimed to describe what characterized and facilitated
181 positive breastfeeding experiences, rather than negative and/or contradictory experiences.
182 Thus, our analysis focused on providing a reciprocal level of translation and a line of
183 argument synthesis. The final themes and sub-themes were reviewed, refined and agreed by
184 all authors.

185

186 Results

187 In the original search, 1.644 hits were retrieved from the database searches and a further 130
188 during the updated search. No papers were identified via additional search methods. A total
189 of 995 abstracts were screened against inclusion/exclusion criteria, 73 were reviewed as full-
190 texts and 17 included in the final review (see PRISMA, Figure 1).

191

192 (Insert Figure 1)

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194 The study characteristics and quality appraisal grade of the included studies are presented in
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2 195 Table 2. One of the studies was reported in three papers [30-32] and one study in two papers
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4 196 [33, 34], thus overall, the 17 articles comprised 14 studies. The 14 studies were conducted in
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7 197 the US (n=4) [35-38], Finland (n=3) [39-41], Sweden (n=2) [30-32, 42], Canada (n=2) [43,
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9 198 44], Norway (n=1) [45], Sweden and England (n=1) [33, 34], and Finland and US (n=1) [46].
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12 199 Overall, these studies represent the views of 697 mothers. The focus for the papers were on
13
14 200 breastfeeding experiences (n=13) or the expression and provision of breast milk (n=4). Ten
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16 201 papers focussed on experiences during the infant's hospitalization, five on both the
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18 202 hospitalization and after discharge home, and two on experiences at home, after discharge.
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21 203 Although a broad definition of breastfeeding was used during the literature search and
22
23 204 selection of papers, positive experiences of *feeding* the infant were described when the mother
24
25 205 breastfed at breast. All studies included preterm infants, with some born as early as 23 weeks
26
27 206 gestation. In all studies but one, the infant's age ranged from 1 day to 18 months at the time
28
29 207 of data collection. In the remaining study, the age of the infants ranged from newborn to 20
30
31
32 208 years of age [39]. Studies were conducted between 2008-2010 (n=3), 2011-2015 (n=6), and
33
34 209 2016-2019 (n=3) and for two studies the year was not stated. The data collection methods
35
36 210 generally involved interviews, but written texts in surveys, a single open-ended question,
37
38
39 211 narratives in social media, or observations were also employed.
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46 213 (Insert Table 2)
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51 215 In the next section we first provide the line of argument synthesis to define a positive
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53 216 breastfeeding experience. We then detail the three themes and associated subthemes that
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55 217 describe the facilitators, situations and experiences that constitute and underpin positive
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57
58 218 attuned breastfeeding.
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220 **A positive breastfeeding experience – feeling attuned**

221 We defined a ‘positive breastfeeding experience’ as feeling attuned when breastfeeding.
222 Feeling attuned was an experience that could occur briefly, or for a longer period, at any time
223 from birth, regardless of breast milk intake, frequency and/or duration achieved. Mothers
224 described attuned breastfeeding in terms of an emotional embodied connection [32, 43, 46],
225 an experienced mutual interaction [32, 33], a “*symbiosis*” [41], or as a “*private moment of*
226 *intimacy*” between them [41]. Attuned breastfeeding occurred when the mother trusted her
227 body and what it could do, when the mother could be in the here and now and when she
228 experienced mutual positive responses with her infant. Attuned breastfeeding was a joint
229 reciprocal activity where both the infant and the mother contributed to the experience, and an
230 interaction of psychological, social, physical and/or context related factors enabled the
231 breastfeeding experience to be enjoyable and comfortable. Below we present the three themes
232 and associated sub-themes that describe how attuned breastfeeding experience can be
233 facilitated (see Table 3).

234
235 (Insert Table 3)

236
237 ***Trusting the body and what it can do***

238 The theme of ‘trusting the body and what it can do’ comprises three subthemes, which
239 describe how attuned breastfeeding is facilitated through understanding the bodily responses
240 and capacity to produce breast milk (‘trusting the body’s capacity’), having faith and trust in
241 the power of milk (‘transferring goodness’) and feeling comfortable with holding their infant
242 and to breastfeed (‘trusting the ‘how to’).

244 *Trusting the body's capacity*

245 Six papers highlighted how women's trust in their bodies was important for a pleasurable
246 experience of breastfeeding [32-34, 42, 43]. Boucher described this as "*the mother had to*
247 *become more in tune with her body*" [43]. The studies described how mothers discovered
248 their own physical limitations and gained a deeper understanding of how their mood, stress
249 [33, 35, 39, 40, 43], and sleep [43, 44] impacted on their bodies ability to breastfeed. One
250 mother in Boucher et al's study described:

251
252 *"To me the best thing to ensure effective breastfeeding is to know how your body*
253 *works and what schedule works best, know your own system, your own schedule...*
254 *and where's your sleep at."* [43].

255
256 Women's trust in their bodies mainly related to their capacity to produce breast milk. This
257 was reflected by a mother in Ikonen et al's study who stated: "*Beginning by expression was*
258 *worth it. I was able to breastfeed when the time came for me to do it.*" [39]. In most studies
259 the production of breast milk was seen as the initial start of a breastfeeding journey [31, 32,
260 35, 36, 39, 40, 43, 44, 46]. Mothers with very preterm infants described that it could take
261 months until their infants had transitioned fully to breastfeeding and that this did not always
262 occur during the infant's hospitalization [40, 45]. The expression of breast milk was therefore
263 an important "*stepping stone*" [44] and the beginning of a temporary process [31, 42] that
264 would hopefully lead to the ultimate reward of breastfeeding [32, 35, 36, 39, 43, 44]. A
265 mother in Bujold et al's study [44] described:

266

267 *“Pumping my milk, well it is part of the breastfeeding process. We’ve now started*
1
2 268 *to feed him at the breast, it’s very motivating for me, it definitely makes me feel*
3
4
5 269 *closer to my child. (P01)” [44]*
6

7 270
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9
10 271 Strategies that helped milk production and women’s trust in their capacity to produce breast
11
12 272 milk was holding the infant, having the infant skin-to-skin, or practicing breastfeeding [35,
13
14 273 40, 44]. A mother in Niela-Vilen et al’s study [40] stated:

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19 275 *“I believe that the daily kangarooing was really important because if the milk*
20
21 276 *secretion didn’t start properly, but during kangarooing it started to flow. (025)”*
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24 277 [40]

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26 278
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28
29 279 Being able to express near the baby or in privacy by using drapes or screens [39, 42, 44] and
30
31 280 having functional and easy to use equipment [35, 37, 39, 44] were regarded as facilitative.
32
33
34 281 Staff or peer supporters encouragement, shared experiences, and support made mothers feel
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36 282 hope and security [31, 35, 42] in their bodies’ capacities and served as powerful motivators to
37
38
39 283 initiate and sustain breast milk expression [35, 37, 38, 44].

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41 284
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44 285 *Transferring goodness*

45
46 286 A key facilitator for a positive breastfeeding experience was the belief or feeling that the
47
48 287 provision of breast milk was a ‘transfer of goodness’. Mothers described that they had faith in
49
50
51 288 the power of milk to increase their infant’s health, mitigate complications and help the infant
52
53 289 grow [35, 36, 38, 39, 41, 43, 45]. Breast milk was described as a “lifeline” [39] and that
54
55
56 290 providing milk was equivalent to “giving life” [38]. A mother in Rossman et al’s study stated:
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58 291 *“I’m giving him life, medicine, food, and a part of me, all in a feeding every 2 hours.” [38].*
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292 These beliefs mainly stemmed from the staff providing information and demonstrating
1
2 293 positive attitudes towards breast milk and breastfeeding [38, 40], a positive breastfeeding
3
4 294 culture, and the encouragement and support from the woman's family or peers [35, 37, 44].
5
6
7 295 Mothers separated from their infants, initially or for most of the hospitalization, described that
8
9 296 by expressing breast milk they had a purpose in being a mother and thereby felt connected
10
11 297 [35, 38, 39, 41, 44, 46]. One mother stated: "*I think the breast milk—it's me. I feel connected*
12
13 298 *'cause my breast milk is a part of me. I mean, I'm makin' this milk.*" [38]. Mothers often felt
14
15 299 that producing breast milk was the only thing they could do and that providing breast milk
16
17 300 was the only thing they could give [38, 39, 46]. For these women, expressing breast milk
18
19 301 reminded them that they were a mother [41], and that they played a vital role in contributing
20
21 302 to their infant's care [35, 39, 44, 46].
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303

304 *Trusting the 'how to'*

305 An embodied feeling of trust in 'how to' breastfeed, including how to hold their infant and the
31
32 306 techniques in breastfeeding, were reported in a number of studies [31-34, 36, 43, 46]:
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307

308 *"It's all about holding your breast; it's really the techniques. You need to know*
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41 309 *[your breast]. And you have to feel comfortable with it."* [43]
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310

311 Mothers needed to feel comfortable with holding their infant in order to experience a positive
46
47 312 breastfeeding experience [31-33, 36, 43]. Some mothers described that they held their infant
48
49 313 "*instinctively*" and felt comfortable with it [33], and while multiparous mothers found holding
50
51 314 and breastfeeding easier (43), for others the feeling of being comfortable and secure
52
53
54 315 progressed with time [33, 43].
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316

1
2 317 In most studies, how to hold and how to breastfeed was practised in different degrees during
3 318 the infant’s hospitalization. It was often a process that was balanced between the presence of
4
5 319 staff providing support and advice, and mothers being able to do things in their own way; to
6
7 320 “stand on her own two feet” [42]. For the support to be perceived as supportive, during the
8
9 321 infants’ hospitalization, the transition to home or after discharge, staff needed to be attuned to
10
11 322 the mother as an individual and provide support based on the mother’s needs and her infant’s
12
13 323 needs [30, 31, 40, 42, 45]. Staff needed to be knowledgeable in breastfeeding preterm infants
14
15 324 and provide information and practical guidance in a sensitive and timely manner; providing
16
17 325 more and more pieces of information on e.g. different positions, how to manipulate the breasts
18
19 326 or how to assess a proper latch [30, 31, 34, 40, 42, 43, 45, 46]. Mothers felt supported when
20
21 327 staff were proactive, responsive (e.g., listened, showed interest), respectful (e.g., not judging
22
23 328 or putting demands on the mother) [30, 31, 42, 43, 45], when they provided positive feedback
24
25 329 and gave hope, and made mothers feel safe [30, 42, 43, 45]. A mother in Ericson et al’s study
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27 330 stated:
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34 331
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36 332 *“If I had questions, they could answer them and they were very attuned. I thought*
37
38 333 *the whole conversation was modelled after me. .. like the questions I had and what*
39
40 334 *problems I had and so on. Then there was the encouragement. Sometimes you*
41
42 335 *might not be so eager to continue breastfeeding after so many months of tube*
43
44 336 *feeding and pumping to just get that encouragement, a little pat on the shoulder.*
45
46 337 *(Interview 20)” [30]*
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51 338
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53 339 ***Being emotionally present – in the here and now***

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55 340 In order to experience attuned breastfeeding, mothers need to feel emotionally present; that
56
57 341 they can be in the here and now. Two subthemes describe the importance of physical
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342 closeness and privacy and the reassurance by staff and others for feeling emotionally present
1
2 343 ('feeling relaxed' and 'feeling reassured').
3

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6
7 345 *Feeling relaxed*

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9 346 Mothers referred to how they needed to feel relaxed to achieve a state of attuned breastfeeding
10
11 347 [32-34, 40, 42, 45, 46]. Feeling relaxed became easier by increased physical closeness and
12
13 348 privacy [42], such as through having a single family room [33, 46]. In Flacking and Dykes
14
15 349 study, one of the mothers stated: "*In there [the nursery], it's a bit noisy and people are*
16
17 350 *coming and going. She seems to have a better go if it's quieter and I am relaxed.*" [33]. A
18
19 351 private, familiar and safe space enabled mothers to act more freely and to immerse themselves
20
21 352 in the breastfeeding experience [33, 46]. Holdren et al [46] described that by having a "*space*
22
23 353 *to process their emotions and begin to get to know their infant*" (p.6), mothers learnt to take
24
25 354 care of themselves and their infant and become more autonomous:
26
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31 355

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34 356 *"It kinda felt like you can do ... what you want more freely...because things like,*
35
36 357 *like talking to the baby or singing to the baby ... even though it kinda feels like the*
37
38 358 *most normal thing, but when you have someone else in the room you kind of feel a*
39
40 359 *bit more self conscious. And bursting into tears uhh next to someone who you*
41
42 360 *don't know ... it's not like the most, the most, most comfortable thing. (F2)" [46]*
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48 362 For other mothers, the closeness and privacy did not occur until they came home to a familiar
49
50 363 environment, "*a safe haven*" [45].
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55 365 *Feeling reassured*
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366 Another factor that enabled women to be in the here and now and to experience positive
1 breastfeeding was the reassurance from staff and others that all was “going well”. Positive
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5 368 feedback from staff contributed to a feeling of security and calmness during hospitalization
6
7 369 [30, 31, 34, 42] and at home [30, 45]. For some mothers, having the staff outside their private
8
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10 370 space, monitoring the infants, and entering their space when needed was reassuring [33]. A
11
12 371 mother in Björk et al’s study wrote:

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14 372
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16
17 373 *“It was very positive that the health professional was so calm and encouraging*
18
19 374 *but not too pushy and stayed in the background. It is important that they step*
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21
22 375 *forward now and then and give advice but at the same time let me try on my*
23
24 376 *own.” [42]*

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29 378 This sense of reassurance was not only linked to breastfeeding *per se* but also to other aspects
30
31
32 379 of being a mother of a preterm or LBW infant. Such reassurance could derive from staff [30,
33
34 380 31] but also from other parents of preterm infants who had “walked in my shoes” [37]. Thus,
35
36
37 381 peer supporters through their “mothering the mother” [37] approach facilitated a state of calm
38
39 382 and wellbeing [37, 38]:

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44 384 *“They are really big on talking about postpartum depression and the counseling*
45
46 385 *services available if I’m feeling stressed. So, they help with more than just*
47
48
49 386 *breastfeeding. It’s kind of the whole package of dealing with having a baby in the*
50
51 387 *NICU. “ [37]*

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56 389 ***Experiencing mutual positive responses***

390 A sense of mutuality was a key facet of an attuned breastfeeding experience. Three subthemes
391 describe this, where the mother recognise (*'seeing and interpreting the infant's cues'*),
392 respond (*'responding to infant's cues'*), and then experience the infant's response (*'seeing a
positive response from the infant'*).

394
395 *Seeing and interpreting the infant's cues*

396 Several studies described the importance of mothers being able to recognise their infant's pre-
397 feeding signals [33, 34, 36, 40, 43, 46] and their state of sleep-wakefulness [33, 34, 36].

398 Mothers described that being able to interpret their infant's abilities, instincts and responses
399 accurately made them feel that breastfeeding was a shared responsibility where they managed
400 breastfeeding together as a team [42, 45, 46]. Boucher et al described this as becoming "*an
expert on observing and interpreting her infant's behaviour*" [43]. One mother reported:

402
403 *"You've got to learn how to read your baby... know exactly how much milk she's
404 getting, learn if she's eating effectively, if she's latching properly.... I thought that
405 everything with motherhood clicks instinctively. It doesn't."* [43]

406
407 Early positive feeding experiences, such as for mothers of infants with a low gestational age,
408 related to 'joyful' and 'fantastic' experiences. Mothers were surprised by their infant's
409 competence and capacity the first time at the breast [42, 46], and the subtle, yet evident, cues
410 their infants showed:

411
412 *"Well, of course it was really, well just fantastic.... And even the first times that,
413 well, not even breastfeeding, but when they said that you could like bring him next*

1
2 414 *to your breast, and kind of like smell, and maybe lick a little bit. So that was for*
3 415 *me kind of the experience. (F2)” [46]*

4
5 416
6
7 417 However, mothers also needed to have an awareness that the infant’s maturation to breastfeed
8
9
10 418 would take time and that infants could not be rushed. This was described by a mother from
11
12 419 Radtke-Demirci et al’s study [36]:

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14 420
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16
17 421 *”[The connection between breastfeeding and bonding] is different since he’s not*
18
19 422 *in that sleepy mode. Before I don’t even know if I saw it more as, like, nurturing.*
20
21 423 *I’m just like, ‘This is just what I’m to do. He just needs to be held.’ He was*
22
23 424 *supposed to still be inside of me, so of course I loved holding him then, but now I*
24
25 425 *feel like it’s more of like a bonding . . .” [36].*

26
27 426
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31 427 The mothers understanding of the infant’s developing breastfeeding behaviour and
32
33 428 interpreting signals were facilitated by staff describing infants’ cues and behaviour [30, 31,
34
35 429 42, 43, 46]. The studies that described this phenomenon referred to this as a ‘transfer of
36
37 430 knowledge’, and how this reflected a staff member’s individual ‘trait’ rather than a joint unit
38
39 431 responsibility. Some mothers also emphasized that continuity of care was needed to extend
40
41 432 from hospital to soon after discharge via different forms of support e.g., proactive telephone
42
43 433 support, domiciliary care provided by the neonatal unit and staff at other health care facilities
44
45 434 [30, 31, 45].

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47 435
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49 436 *Responding to infant’s cues*
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2 437 Mothers also needed to be able to respond to their infants' pre-feeding signals or sleep-
3
4 438 wakefulness cues [33, 42, 43, 46]. One mother in Flacking and Dykes (2013) study described
5
6 439 her abilities and her twins' cues:

7 440
8
9 441 *“They are lying with me so I know they get what they need. They relax more when*
10
11 442 *they're on me, in the sack [kangaroo wrapping]. But when they're like this [in*
12
13 443 *front of her] I can see them. Then it's easier to see their signs of them being*
14
15 444 *hungry. I try not to breastfeed less than every other hour. Sometimes they want to*
16
17 445 *eat every hour. And sometimes, when I have put them down, they start to squirm*
18
19 446 *and then I breastfeed again,” [33].*

20
21 447
22
23 448 Mothers' abilities to respond to their infants' signals was highly dependent on being
24
25 449 physically present, having skin-to-skin contact, and being enabled or allowed to breastfeed
26
27 450 when their infants' signalled [33, 40, 42, 46], which created “*a window of opportunity for*
28
29 451 *feeding in correspondence to the baby's cues*” [33]. Mothers in Flacking and Dykes's study
30
31 452 [33] described how rooming-in meant that they did not miss their infant's “*periods of*
32
33 453 *awakeness*” [33]. One mother described how she and her partner became attuned to their
34
35 454 infant when assigned a room of their own:

36 455
37
38 456 *“We withdrew from everything. We focused on him and it was peace and quiet*
39
40 457 *and we could hear him. I saw that he was searching so I just put him at the breast*
41
42 458 *and he started to suck and he hadn't before. It was the breakthrough. There were*
43
44 459 *just a few hours in between feedings. I was enabled freedom. I didn't look at the*
45
46 460 *clock but I did as he wanted. God how great! We were attuned to him. (MB6)”*
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48 461 [33]

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463 Mothers described that when breastfeeding could be provided on an on-demand basis,
464 breastfeeding was more enjoyable [36, 42, 43]. A mother in Flacking and Dykes’s study [34]
465 described how staff wanted her to use a nipple shield in order for her infant to “*learn*
466 *quicker*”. She refused as she felt that learning should happen on an individual basis, and that it
467 was more important for her infant to “*suck and lick as he wants it*” [34].

468
469 With time, mothers’ and infants’ abilities to respond to each other was enhanced. A mother in
470 Holdren et al’s study stated: “*We kept practicing and we both improve[d] a lot. (F3)*” [46]. A
471 mother in Niela-Vilen et al’s study described her experiences of feeding her infant between
472 the age of three to twelve months:

473
474 *“Breastfeeding is definitely one of the best things I have ever done. Both I and my*
475 *baby enjoy and we will continue for a long time [at 3 months]. Breastfeeding is*
476 *wonderful. The longer we breastfeed, the more pleasant it becomes. There is a*
477 *special bond between me and my baby because of breastfeeding, and I wouldn’t*
478 *change it for anything in the world [at 6 months]. It still is very comfortable, the*
479 *baby enjoys as well [at 12 months]”* [41].

480
481 *Seeing a positive response from the infant*

482 The third facet of mutuality was the infant’s positive response. When this mutuality occurred,
483 breastfeeding was perceived to be an enjoyable experience for both the mother and her infant
484 [32-34, 36, 40-43]. The interpretation of an infant’s response to breastfeeding depended on
485 the mother’s previous experiences of breastfeeding, the mother’s knowledge about infants’

486 developing breastfeeding behaviours, and/or trust in her infant's instincts [36, 40, 42]. A

487 mother in Björk et al's study wrote:

488
489 *"With some arrangement with pillows and so on it started to work. My son started*
490 *to look for the nipple and suck. Even though it was not for a long time I was at*
491 *that moment thinking 'Yes he knows what to do'. And then the nervousness*
492 *disappeared."* [42].

493
494 Mothers described a positive infant response during breastfeeding as being calm, alert, active,
495 and that the infant sucked and swallowed [34, 36, 40] or fed "efficiently" [32, 34]. A more
496 subtle experience was that infants enjoyed it [34, 40, 41, 46]. A mother in Holdren et al's
497 study described: "...and umm, and I feel like she was really enjoying it even though she didn't
498 get much out of it yet (F3)" [46].

500 Discussion

501
502 This systematic review and meta-ethnography aimed to define what characterizes and
503 facilitates a positive breastfeeding experience in mothers of preterm and/or LBW infants.
504 Insights into positive breastfeeding experiences were derived from 14 studies conducted in six
505 countries. By using reciprocal translation, we identified characteristics of what constitutes a
506 positive breastfeeding experience, an experience that we described as being 'attuned'. Data
507 was synthesized into three themes, 'trusting the body and what it can do', concerns how
508 attuned breastfeeding is facilitated through understanding the bodily responses and capacity to
509 produce breast milk, having faith and trust in the power of milk, and feeling comfortable with
510 holding the infant and to breastfeed. The second theme, 'being emotionally present – in the

1 511 *here and now*’ describes the importance of feeling relaxed and reassured through closeness,
2 512 privacy, the support from staff, peers, and others for feeling emotionally present. The third
3
4 513 theme, ‘*experiencing mutual positive responses*’, concerns how a feeling of mutuality arises
5
6
7 514 when the mother recognises and interprets her infant’s cues, when she is enabled to respond
8
9 515 to those signals and when she receives a positive response from her infant. In the following
10
11 516 sections we first discuss attuned feeding drawing on key insights from the three themes,
12
13 517 followed by a discussion on the three major facilitators for attuned feeding.
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18
19 519 The phenomenon of attunement has been studied extensively, where the primary focus has
20
21 520 been on behavioural, emotional and biological synchrony or mutuality between the mother
22
23 521 and infant [47-50]. Our findings reflect those of Stern in terms of how attunement comprises,
24
25 522 from the parental perspective, a sensitivity and responsiveness to infant cues and attentional
26
27 523 states, and from the infant perspective the biological preparedness to engage in and also to
28
29 524 anticipate attuned interactions, leading to exchanges of infant-parent mutually positive
30
31 525 emotions [51].
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38 527 The quality of parent-infant interaction and communication is an ongoing process that affects
39
40 528 and contributes to the neurobiological regulation of the other [47, 52]. Because breastfeeding
41
42 529 is a key maternal activity, the quality of this experience makes a substantial contribution to
43
44 530 biological, social-emotional, and cognitive well-being [53, 54]. During embodied interactions
45
46 531 such as breastfeeding, the mother and the infant need to coordinate their behaviours and
47
48 532 bodies, both contributing to attunement. Embodied interactions in early life emerges from the
49
50 533 dynamic interplay between signals arising inside the body and through affective exchanges
51
52 534 [55]. As we identified within the review, trusting the body is crucial for attuned breastfeeding.
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55 535 Breastfeeding presents a situation of closeness and proximity, in which the mother feels
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536 attuned when she is emotionally present and in the here and now. When mothers feel relaxed
537 during breastfeeding, the stress levels are reduced and infant behaviour during breastfeeding
538 as well as in other behaviours such as sleep are positively affected [56]. But when mothers are
539 preoccupied or have unresolved trauma they are less attuned to their infant's cues during
540 feeding, compared with those considered secure [57]. This was evident within the included
541 papers in terms of how positive breastfeeding was associated with mothers who were
542 emotionally present and felt connected.

543
544 Mother's ability to see, interpret and respond to infant's cues have mainly been explored in
545 mothers of term infants. Biologically pre-programmed behaviours have been described by
546 Widström and colleagues [58] and Matthiesen and colleagues [59] showing that when term
547 infants are placed in skin-to-skin contact with their mothers immediately after birth, they
548 interact both behaviourally and physiologically leading up to breastfeeding within one or two
549 hours. Thus, this set of behaviours requires maternal attention, availability and physiological
550 and psychological responsiveness. In the preterm dyad, more subtle movements and signs are
551 present and therefore breastfeeding attunement requires a greater level of responsiveness to
552 the infant's cues and behaviours. Pre-feeding cues in preterm infants, just as in term infants,
553 are not only cues of actual hunger but also an innate need to suck [60]. Breastfeeding can thus
554 be the appropriate response to hunger but also to distress and pain [61] or to the infant's need
555 for increased pleasure [62]. Attuned breastfeeding may therefore be viewed as a comforting
556 activity for the mother-infant dyad, in addition to the outcomes of feeding.

557 558 *Facilitators*

559 Across the papers, three major facilitative factors were identified to enable attuned
560 breastfeeding. First, *being in closeness*; holding the infant or having the infant skin-to-skin

1 561 enabled mothers to trust their bodies, become relaxed, and to see and respond to their infant's
2 562 signals. Montirossi and McGlone describe in their review [55], that the infant meets the
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4 563 mother's body before (s)he meets the mother's mind and the mother meets her infant's body
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7 564 before the infant's mind. Thus, the body comes first in the mother-infant interaction, which
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9 565 highlights the importance of physical proximity. Their review suggests that mother-infant
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11 566 interactions fluctuate between attuned and misattuned states, in which the latter can be
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13 567 repaired through e.g., skin-to-skin and affectionate touch and by a maternal sense of their
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15 568 internal bodily states. Skin-to-skin contact entails numerous physiological, physical, and
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17 569 psychological benefits for parents and infants, of which one is the evident positive short and
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19 570 long-term outcomes for breastfeeding [12].
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26 571
27 572 The second major facilitator was the *staff's support and interpersonal relationship with the*
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29 573 *mother*. Schmied et al's findings from their meta-synthesis of women's experiences of
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31 574 breastfeeding support [63], showed that mothers of term infants want staff to be 'authentically
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33 575 present' and have a 'facilitative style' in breastfeeding support. The findings from our study
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35 576 were similar. We found that mothers of preterm/LBW infants experienced good support when
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37 577 staff were attuned and responsive to mother's and infant's needs; reassuring, respectful, and
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39 578 encouraging; when they provided information and practical guidance in a sensitive and timely
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41 579 manner; and had a positive attitude towards breast milk and breastfeeding. Mothers from the
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43 580 included studies also described that staff needed to have specific knowledge in the
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45 581 breastfeeding behaviours of preterm infants and possess skills and knowledge in breastfeeding
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47 582 preterm terms [64]. As nurses in neonatal units provide support for breastfeeding during every
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49 583 shift [65], it is important to include all nurses in breastfeeding training programs to ameliorate
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51 584 the support provided to mothers and infants [66]. Unlike mothers of term infants, mothers of
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53 585 preterm/LBW infants have a much longer hospital stay with more staff encounters, which
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586 places a larger responsibility on staffs' communication skills [67] and to ensure continuity and
587 meaningful relationships [68]. Further, mothers need to be empowered by staff to be 'in
588 charge' of breastfeeding and not become passive recipients of care and support [69]. Within
589 settings where mothers are separated from their infants, it is hard for mothers to take active
590 control to act freely and to gain trust in their capabilities [15]; this is contrary to units where
591 the mother-infant dyad can spend unending time in close physical proximity [5]. However,
592 regardless of the environmental features, staff support is crucial for breastfeeding
593 preterm/LBW infants [70, 71].

594
595 The third major facilitator for attuned breastfeeding was *being enabled to breastfeed* when
596 their infant signalled. By changing neonatal designs to include more private spaces and
597 single-family rooms, the opportunities for mothers to support the infants' resources and
598 capacities (e.g., infants' limited periods in alert behavioural state, strengths, muscle tone)
599 unfolds. In line with the values from family centred care [72], an individual and dyadic
600 approach to promote a more (neuro) developmental supportive breastfeeding context is
601 needed. Cue-based feeding [73-78], responsive feeding [14, 79] and infant driven feeding [80-
602 82], are all synonyms for a view that the infant's signals (i.e., behavioural responses and
603 physiological signals) should guide the process towards full breastfeeding or any oral feeding.
604 However, these approaches to support the infant's developing (breast) feeding behaviour have
605 mainly been described as 'suggestions' in qualitative research or through quality improvement
606 projects. Such approaches require more knowledge and support from the staff to guide
607 mothers on their infant's individual feeding development, and most of all a willingness to
608 evaluate established practices, such as rigid scheduled feeding routines, that are potentially
609 not conducive for mothers and infants.

611 *Strengths and limitations*

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3 612 The strengths of this review are the comprehensive search strategy, and a minimum of two
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5 613 reviewers being involved in each stage to enhance the rigour and trustworthiness. An evident
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8 614 limitation is that most studies were conducted in the Nordic countries. There are several
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10 615 potential reasons for this; the Nordic countries having a history of being pro-breastfeeding
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12 616 cultures and also that the progression towards family centred care has potentially moved faster
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15 617 than in other countries. Another limitation is that few papers have been published on positive
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17 618 experiences. Although a broad definition of breastfeeding was used during the literature
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20 619 search and selection of papers, positive experiences of feeding the infant were only described
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22 620 when the mother breastfed at breast in all papers. One reason for this could be that in many
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25 621 settings the norm and goal is to feed the infant directly at breast [5, 8]. When mothers do not
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27 622 achieve this goal but instead feed the infant by alternative means, i.e. a bottle, the overall
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30 623 experience becomes negative. Another reason could be that researchers regard ‘breastfeeding
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32 624 at breast’ as the focus of their paper and therefore not pay attention to positive experiences by
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35 625 other feeding methods. We would argue that attuned feeding occur irrespective of what
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37 626 method is used. Another limitation is the ‘staff-centeredness’ in many of the papers. A few of
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40 627 the papers described significant others’ (e.g., relatives, fathers, other mums in the neonatal
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42 628 units) attitudes towards breast milk and breastfeeding as being influential, but not in terms of
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45 629 actual support they provided. This could be due to the authoritative and institutionalised
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47 630 environment that neonatal units represent, in combination with a ‘medicalization’ of
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49 631 breastfeeding preterm infants, which reinforces staffs’ power and opportunities to assess,
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52 632 judge and evaluate the breastfeeding performance. As shown, no single study contributed to
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54 633 all the sub-themes, but the studies collectively enabled richer and more in-depth insights into
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57 634 what characterizes and facilitates a positive breastfeeding experience. Future research should
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59 635 focus on what constitutes attuned breastfeeding in different neonatal unit contexts, with
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636 different populations (e.g. from lower/middle income settings). Maybe more importantly,
637 there is a need to evaluate different strategies and interventions in early breastfeeding, where
638 the infants' and mothers' emotional and physical needs and capacities are acknowledged.

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640

641 **Conclusion**

642 This systematic review and meta-ethnographic methods identified positive breastfeeding
643 experiences as being 'attuned'. Attuned breastfeeding occurred when the mother trusted her
644 body and what it could produce, when she could be emotionally and physical present in the
645 here and now and when she experienced mutual positive responses with her infant. The most
646 prominent facilitating factors for experiencing attuned breastfeeding were being in close
647 physical proximity with the infant, meaningful and sensitive staff support and positive staff-
648 mother interpersonal relationships, and being enabled to breastfeed when the infant signalled.
649 This study offers new insights into how staff and gatekeepers in neonatal units can facilitate
650 and enable mothers to achieve more positive breastfeeding experiences with a more
651 prominent focus on the relational aspects of breastfeeding. Positive breastfeeding support
652 requires a favourable environment which enhances mother-infant dyads closeness and trust in
653 the mother's and infant's capacities.

654

655 **Declarations**

656 ***Ethics approval and consent to participate***

657 Not applicable

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659 ***Consent for publication***

660 Not applicable

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662 ***Availability of data and materials***

663 Data sharing is not applicable to this article as no datasets were generated or analysed during
664 the current study.

665

666 ***Competing interests***

667 The authors declare that they have no competing interests.

668

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671

672 ***Authors' contributions***

673 The study was designed by RF and GT, RF directed and coordinated the work, GT provided
674 conceptual and methodological guidance, all authors participated in the review, data
675 extraction and quality appraisals, RF wrote the original draft, GT was a major contributor in
676 writing the manuscript, all authors commented on the manuscript and all authors read and
677 approved the final manuscript.

678

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683 (<https://sites.utu.fi/scene/>).

684

685 Legend to figure 1: Figure 1. PRISMA flow diagram.

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9

10 689 1. Taylor SN. Solely human milk diets for preterm infants. *Semin Perinatol.* 2019;

11

12 43(7):151158.

13 690

14

15 691 2. Mahon J, Claxton L, Wood H. Modelling the cost-effectiveness of human milk and

16

17 breastfeeding in preterm infants in the United Kingdom. *Health Econ Rev.* 2016; 6:54.

18 692

19

20 693 3. Bonet M, Blondel B, Agostino R, Combier E, Maier RF, Cuttini M, et al. Variations in

21

22 breastfeeding rates for very preterm infants between regions and neonatal units in

23 694

24

25 695 Europe: results from the MOSAIC cohort. *Arch Dis Child Fetal Neonatal Ed.* 2011;

26

27 96(6):450-452.

28 696

29

30 697 4. Wilson E, Edstedt Bonamy AK, Bonet M, Toome L, Rodrigues C, Howell EA, et al.

31

32 698 Room for improvement in breast milk feeding after very preterm birth in Europe:

33

34 Results from the EPICE cohort. *Matern Child Nutr.* 2018; 14(1):e12485.

35 699

36

37 700 5. Grundt H, Tandberg BS, Flacking R, Drageset J, Moen A. Associations between

38

39 701 single-family room care and breastfeeding rates in preterm infants. *J Hum Lact.* 2021;

40

41 37(3):593-602.

42 702

43

44 703 6. Michels KA, Ghassabian A, Mumford SL, Sundaram R, Bell EM, Bello SC, et al.

45

46 704 Breastfeeding and motor development in term and preterm infants in a longitudinal US

47

48 cohort. *Am J Clin Nutr.* 2017; 106(6):1456-1462.

49 705

50

51 706 7. Flacking R, Nyqvist KH, Ewald U. Effects of socioeconomic status on breastfeeding

52

53 duration in mothers of preterm and term infants. *Eur J Public Health.* 2007; 17(6):579-

54 707

55

56 584.

57 708

58

59

60

61

62

63

64

65

- 709 8. Jonsdottir RB, Jonsdottir H, Orlygsdottir B, Flacking R. A shorter breastfeeding
1 duration in late preterm infants than term infants during the first year. *Acta Paediatr.*
2 710
3
4 711 2021; 110:1209–1217.
- 5
6
7 712 9. Reyna BA, Pickler RH, Thompson A. A descriptive study of mothers' experiences
8
9 713 feeding their preterm infants after discharge. *Adv Neonatal Care.* 2006; 6(6):333-340.
- 10
11
12 714 10. Callen J, Pinelli J, Atkinson S, Saigal S. Qualitative analysis of barriers to
13
14 715 breastfeeding in very-low-birthweight infants in the hospital and postdischarge. *Adv*
15
16 716 *Neonatal Care.* 2005; 5(2):93-103.
- 17
18
19 717 11. Nyqvist KH, Sjoden PO, Ewald U. The development of preterm infants' breastfeeding
20
21 718 behavior. *Early Hum Dev.* 1999; 55(3):247-264.
- 22
23
24 719 12. Mekonnen AG, Yehualashet SS, Bayleyegn AD. The effects of kangaroo mother care
25
26 720 on the time to breastfeeding initiation among preterm and LBW infants: a meta-
27
28 721 analysis of published studies. *Int Breastfeed J.* 2019; 14:12.
- 29
30
31 722 13. Lucas RF, Smith RL. When is it safe to initiate breastfeeding for preterm infants? *Adv*
32
33 723 *Neonatal Care.* 2015; 15(2):134-141.
- 34
35
36 724 14. Watson J, McGuire W. Responsive versus scheduled feeding for preterm infants.
37
38 725 *Cochrane Database Syst Rev.* 2016; (8):CD005255.
- 39
40
41 726 15. Flacking R, Ewald U, Nyqvist KH, Starrin B. Trustful bonds: a key to "becoming a
42
43 727 mother" and to reciprocal breastfeeding. *Stories of mothers of very preterm infants at a*
44
45 728 *neonatal unit. Soc Sci Med.* 2006; 62(1):70-80.
- 46
47
48 729 16. Dykes F, Flacking R. Encouraging breastfeeding: A relational perspective. *Early Hum*
49
50 730 *Dev.* 2010; 86(11):733-736.
- 51
52
53 731 17. Alves E, Rodrigues C, Fraga S, Barros H, Silva S. Parents' views on factors that help
54
55 732 or hinder breast milk supply in neonatal care units: systematic review. *Arch Dis Child*
56
57 733 *Fetal Neonatal Ed.* 2013; 98(6):F511-517.
- 58
59
60
61
62
63
64
65

- 734 18. Briere CE, McGrath J, Cong X, Cusson R. An integrative review of factors that
1
2 735 influence breastfeeding duration for premature infants after NICU hospitalization. J
3
4 736 Obstet Gynecol Neonatal Nurs. 2014; 43(3):272-281.
5
6
7 737 19. Ikonen R, Paavilainen E, Kaunonen M. Preterm infants' mothers' experiences with
8
9 738 milk expression and breastfeeding: an integrative review. Adv Neonatal Care. 2015;
10
11 739 15(6):394-406.
12
13
14 740 20. Morelius E, Kling K, Haraldsson E, Alehagen S. You can't flight, you need to fight-A
15
16 741 qualitative study of mothers' experiences of feeding extremely preterm infants. J Clin
17
18 742 Nurs. 2020; 29(13-14):2420-2428.
19
20
21 743 21. Palmquist AEL, Holdren SM, Fair CD. "It was all taken away": Lactation,
22
23 744 embodiment, and resistance among mothers caring for their very-low-birth-weight
24
25 745 infants in the neonatal intensive care unit. Soc Sci Med. 2020; 244:112648.
26
27
28 746 22. Cescutti-Butler L, Hemingway A, Hewitt-Taylor J. "His tummy's only tiny" -
29
30 747 Scientific feeding advice versus women's knowledge. Women's experiences of feeding
31
32 748 their late preterm babies. Midwifery. 2019; 69:102-109.
33
34
35 749 23. Dosani A, Hemraj J, Premji SS, Currie G, Reilly SM, Lodha AK, et al. Breastfeeding
36
37 750 the late preterm infant: experiences of mothers and perceptions of public health nurses.
38
39 751 Int Breastfeed J. 2016; 12:23.
40
41
42 752 24. Noblit GW, Hare RD. Meta-ethnography: Synthesizing qualitative studies. London:
43
44 753 Sage Publications; 1988.
45
46
47 754 25. France EF, Cunningham M, Ring N, Uny I, Duncan EAS, Jepson RG, et al.
48
49 755 Improving reporting of meta-ethnography: the eMERGe reporting guidance. BMC
50
51 756 Med Res Methodol. 2019; 19:25.
52
53
54 757 26. Flacking R, Thomson G, Trickey H, Silnes Tandberg B, Niela-Vilen H, Ewald U, et
55
56 758 al. A meta-ethnographic study of facilitators for positive breastfeeding experiences
57
58
59
60
61
62
63
64
65

759 and the needs for breastfeeding support in mothers of preterm and/or low-birth-weight
1
2 760 infants. 2018; PROSPERO CRD42018108310.
3
4 761 27. World Health Organization Global Strategy for Infant and Young Child Feeding..
5
6
7 762 Geneva: WHO; 2003.
8
9 763 28. Walsh D, Downe S. Appraising the quality of qualitative research. *Midwifery*. 2006;
10
11 764 22(2):108-119.
12
13
14 765 29. Downe S WS, Walsh D, Simpson L, Steen M. Template for metasynthesis. Contact:
15
16 766 sdowne@uclan.ac.uk. 2009.
17
18
19 767 30. Ericson J, Flacking R, Udo C. Mothers' experiences of a telephone based
20
21 768 breastfeeding support intervention after discharge from neonatal intensive care units: a
22
23 769 mixed-method study. *Int Breastfeed J*. 2017; 12:50.
24
25
26 770 31. Ericson J, Palmer L. Mothers of preterm infants' experiences of breastfeeding support
27
28 771 in the first 12 months after birth: A qualitative study. *Birth*. 2019; 46(1):129-136.
29
30
31 772 32. Palmer L, Ericson J. A qualitative study on the breastfeeding experience of mothers of
32
33 773 preterm infants in the first 12 months after birth. *Int Breastfeed J*. 2019; 14:35.
34
35
36 774 33. Flacking R, Dykes F. 'Being in a womb' or 'playing musical chairs': the impact of
37
38 775 place and space on infant feeding in NICUs. *BMC Pregnancy Childbirth*. 2013;
39
40 776 13:179.
41
42
43 777 34. Flacking R, Dykes F. Perceptions and experiences of using a nipple shield among
44
45 778 parents and staff - an ethnographic study in neonatal units. *BMC Pregnancy*
46
47 779 *Childbirth*. 2017; 17:1.
48
49
50
51 780 35. Parker MG, Lopera AM, Kalluri NS, Kistin CJ. "I felt like I was a part of trying to
52
53 781 keep my baby alive": Perspectives of Hispanic and Non-Hispanic black mothers in
54
55 782 providing milk for their very preterm infants. *Breastfeed Med*. 2018; 13(10):657-665.
56
57
58
59
60
61
62
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46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
- 783 36. Radtke Demirci J, Happ MB, Bogen DL, Albrecht SA, Cohen SM. Weighing worth
784 against uncertain work: the interplay of exhaustion, ambiguity, hope and
785 disappointment in mothers breastfeeding late preterm infants. *Matern Child Nutr.*
786 2015; 11(1):59-72.
- 787 37. Rossman B, Engstrom JL, Meier PP, Vonderheid SC, Norr KF, Hill PD. "They've
788 walked in my shoes": mothers of very low birth weight infants and their experiences
789 with breastfeeding peer counselors in the neonatal intensive care unit. *J Hum Lact.*
790 2011; 27(1):14-24.
- 791 38. Rossman B, Kratovil AL, Greene MM, Engstrom JL, Meier PP. "I have faith in my
792 milk": the meaning of milk for mothers of very low birth weight infants hospitalized in
793 the neonatal intensive care unit. *J Hum Lact.* 2013; 29(3):359-365.
- 794 39. Ikonen R, Paavilainen E, Kaunonen M. Trying to live with pumping: expressing milk
795 for preterm or small for gestational age infants. *MCN Am J Matern Child Nurs.* 2016;
796 41(2):110-115.
- 797 40. Niela-Vilen H, Axelin A, Melender HL, Salanterä S. Aiming to be a breastfeeding
798 mother in a neonatal intensive care unit and at home: a thematic analysis of peer-
799 support group discussion in social media. *Matern Child Nutr.* 2015; 11(4):712-726.
- 800 41. Niela-Vilen H, Axelin A, Salanterä S, Melender HL. A typology of breastfeeding
801 mothers of preterm infants: A qualitative analysis. *Adv Neonatal Care.* 2019;
802 19(1):42-50.
- 803 42. Bjork M, Thelin A, Peterson I, Hammarlund K. A journey filled with emotions--
804 mothers' experiences of breastfeeding their preterm infant in a Swedish neonatal ward.
805 *Breastfeed Rev.* 2012; 20(1):25-31.
- 806 43. Boucher CA, Brazal PM, Graham-Certosini C, Carnaghan-Sherrard K, Feeley N.
807 Mothers' breastfeeding experiences in the NICU. *Neonatal Netw.* 2011; 30(1):21-28.

- 808 44. Bujold M, Feeley N, Axelin A, Cinquino C. Expressing human milk in the NICU:
1
2 809 Coping mechanisms and challenges shape the complex experience of closeness and
3
4
5 810 separation. *Adv Neonatal Care*. 2018; 18(1):38-48.
6
- 7 811 45. Breivold K, Hjaelmhult E, Sjostrom-Strand A, Hallstrom IK. Mothers' experiences
8
9 812 after coming home from the hospital with a moderately to late preterm infant - a
10
11
12 813 qualitative study. *Scand J Caring Sci*. 2019; 33(3):632-640.
13
- 14 814 46. Holdren S, Fair C, Lehtonen L. A qualitative cross-cultural analysis of NICU care
15
16
17 815 culture and infant feeding in Finland and the U.S. *BMC Pregnancy Childbirth*. 2019;
18
19 816 19:345.
20
- 21 817 47. Leclere C, Viaux S, Avril M, Achard C, Chetouani M, Missonnier S, Cohen D. Why
22
23
24 818 synchrony matters during mother-child interactions: a systematic review. *PLoS One*.
25
26 819 2014; 9(12):e113571.
27
28
- 29 820 48. Feldman R, Greenbaum CW, Yirmiya N. Mother-infant affect synchrony as an
30
31 821 antecedent of the emergence of self-control. *Dev Psychol*. 1999; 35(1):223-231.
32
33
- 34 822 49. Ruttle PL, Serbin LA, Stack DM, Schwartzman AE, Shirtcliff EA. Adrenocortical
35
36 823 attunement in mother-child dyads: importance of situational and behavioral
37
38
39 824 characteristics. *Biol Psychol*. 2011; 88(1):104-111.
40
- 41 825 50. Morelius E, Brostrom EB, Westrup B, Sarman I, Ortenstrand A. The Stockholm
42
43
44 826 Neonatal Family-Centered Care Study: effects on salivary cortisol in infants and their
45
46 827 mothers. *Early Hum Dev*. 2012; 88(7):575-581.
47
48
- 49 828 51. Stern D: *The interpersonal world of the infant: A view from psychoanalysis and*
50
51 829 *developmental psychology*. New York: Basic Books; 1985.
52
53
- 54 830 52. Trout M. Presence and attunement in health care: a view from infancy research. *Creat*
55
56 831 *Nurs*. 2011; 17(1):16-21.
57
- 58 832 53. Bowlby J: *Attachment and Loss Vol.1 Attachment*. London: Random House; 1969.
59
60
61
62
63
64
65

- 1
2
3
4
5
6
7
8
9
10
11
12
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46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
- 833 54. Hemmi MH, Wolke D, Schneider S. Associations between problems with crying,
834 sleeping and/or feeding in infancy and long-term behavioural outcomes in childhood:
835 a meta-analysis. *Arch Dis Child*. 2011; 96(7):622-629.
- 836 55. Montirosso R, McGlone F. The body comes first. Embodied reparation and the co-
837 creation of infant bodily-self. *Neurosci Biobehav Rev*. 2020; 113:77-87.
- 838 56. Mohd Shukri NH, Wells J, Eaton S, Mukhtar F, Petelin A, Jenko-Praznikar Z, et al.
839 Randomized controlled trial investigating the effects of a breastfeeding relaxation
840 intervention on maternal psychological state, breast milk outcomes, and infant
841 behavior and growth. *Am J Clin Nutr*. 2019; 110(1):121-130.
- 842 57. Messina S, Reisz S, Hazen N, Jacobvitz D. Not just about food: attachments
843 representations and maternal feeding practices in infancy. *Attach Hum Dev*. 2020;
844 22(5):514-533.
- 845 58. Widstrom AM, Brimdyr K, Svensson K, Cadwell K, Nissen E. Skin-to-skin contact
846 the first hour after birth, underlying implications and clinical practice. *Acta Paediatr*.
847 2019; 108(7):1192-1204.
- 848 59. Matthiesen AS, Ransjo-Arvidson AB, Nissen E, Uvnas-Moberg K. Postpartum
849 maternal oxytocin release by newborns: effects of infant hand massage and sucking.
850 *Birth*. 2001; 28(1):13-19.
- 851 60. de Vries JI, Visser GH, Prechtel HF. The emergence of fetal behaviour. I. Qualitative
852 aspects. *Early Hum Dev*. 1982; 7(4):301-322.
- 853 61. Benoit B, Newman A, Martin-Misener R, Latimer M, Campbell-Yeo M. The influence
854 of breastfeeding on cortical and bio-behavioural indicators of procedural pain in
855 newborns: Findings of a randomized controlled trial. *Early Hum Dev*. 2021;
856 154:105308.

- 1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
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46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
- 857 62. Silva GA, Costa KA, Giugliani ER. Infant feeding: beyond the nutritional aspects. *J*
858 *Pediatr (Rio J)*. 2016; 92(3 Suppl 1):S2-7.
- 859 63. Schmied V, Beake S, Sheehan A, McCourt C, Dykes F. Women's perceptions and
860 experiences of breastfeeding support: a metasynthesis. *Birth*. 2011; 38(1):49-60.
- 861 64. Blatz MA, Huston AJ, Anthony MK. Influence of NICU nurse education on intention
862 to support lactation using tailored techniques: A pilot study. *Adv Neonatal Care*. 2020;
863 20(4):314-323.
- 864 65. Froh E, Dahlmeier K, Spatz DL. NICU nurses and lactation-based support and care.
865 *Adv Neonatal Care*. 2017; 17(3):203-208.
- 866 66. Maastrup R, Rom AL, Walloe S, Sandfeld HB, Kronborg H. Improved exclusive
867 breastfeeding rates in preterm infants after a neonatal nurse training program focusing
868 on six breastfeeding-supportive clinical practices. *PLoS One*. 2021; 16(2):e0245273.
- 869 67. Bry K, Bry M, Hentz E, Karlsson HL, Kyllonen H, Lundkvist M, et al.
870 Communication skills training enhances nurses' ability to respond with empathy to
871 parents' emotions in a neonatal intensive care unit. *Acta Paediatr*. 2016; 105(4):397-
872 406.
- 873 68. Sigurdson K, Profit J, Dhurjati R, Morton C, Scala M, Vernon L, et al. Former NICU
874 families describe gaps in Family-Centered Care. *Qual Health Res*. 2020; 30(12):1861-
875 1875.
- 876 69. Ericson J, Palmer L. Cessation of breastfeeding in mothers of preterm infants-A mixed
877 method study. *PLoS One*. 2020; 15(5):e0233181.
- 878 70. Nyqvist KH, Haggkvist AP, Hansen MN, Kylberg E, Frandsen AL, Maastrup R, et al.
879 Expansion of the baby-friendly hospital initiative ten steps to successful breastfeeding
880 into neonatal intensive care: expert group recommendations. *J Hum Lact*. 2013;
881 29(3):300-309.

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65
- 882 71. Gerhardsson E, Hildingsson I, Mattsson E, Funkquist EL. Prospective questionnaire
883 study showed that higher self-efficacy predicted longer exclusive breastfeeding by the
884 mothers of late preterm infants. *Acta Paediatr.* 2018; 107(5):799-805.
- 885 72. Thomson G, Moran VH, Axelin A, Dykes F, Flacking R. Integrating a sense of
886 coherence into the neonatal environment. *BMC Pediatr.* 2013; 13:84.
- 887 73. Fry TJ, Marfurt S, Wengier S. Systematic review of quality improvement initiatives
888 related to cue-based feeding in preterm infants. *Nurs Womens Health.* 2018;
889 22(5):401-410.
- 890 74. Lubbe W. Clinicians guide for cue-based transition to oral feeding in preterm infants:
891 An easy-to-use clinical guide. *J Eval Clin Pract.* 2018; 24(1):80-88.
- 892 75. Newland L, L'Huillier M W, Petrey B. Implementation of cue-based feeding in a level
893 III NICU. *Neonatal Netw.* 2013; 32(2):132-137.
- 894 76. Shaker CS. Cue-based feeding in the NICU: using the infant's communication as a
895 guide. *Neonatal Netw.* 2013; 32(6):404-408.
- 896 77. Thoyre S, Park J, Pados B, Hubbard C. Developing a co-regulated, cue-based feeding
897 practice: The critical role of assessment and reflection. *J Neonatal Nurs.* 2013;
898 19(4):139-148.
- 899 78. Whetten CH. Cue-based feeding in the NICU. *Nurs Womens Health.* 2016; 20(5):507-
900 510.
- 901 79. Theurich MA, McCool-Myers M, Koletzko B. Supporting breastfeeding of small, sick
902 and preterm neonates. *Semin Perinatol.* 2020:151387.
- 903 80. Dalglish SR, Kosticky LL, Blachly N. Eating in "SINC": Safe Individualized Nipple-
904 Feeding Competence, a quality improvement project to explore infant-driven oral
905 feeding for very premature infants requiring noninvasive respiratory support. *Neonatal*
906 *Netw.* 2016; 35(4):217-227.

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907 81. Gianni ML, Sannino P, Bezze E, Plevani L, Esposito C, Muscolo S, et al. Usefulness
908 of the Infant Driven Scale in the early identification of preterm infants at risk for
909 delayed oral feeding independency. *Early Hum Dev.* 2017; 115:18-22.

910 82. Settle M, Francis K. Does the Infant-Driven Feeding Method positively impact
911 preterm infant feeding outcomes? *Adv Neonatal Care.* 2019; 19(1):51-55.

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Table 1. Search terms and inclusion/exclusion criteria mapped to PEO framework

Criteria	Inclusion criteria	Exclusion criteria	Terms
Study population	Mothers of preterm (<37 weeks gestation) or low birth weight (<2500 grams) infants who have been admitted to a neonatal unit Neonatal unit = Neonatal Intensive Care Unit (NICU), Special Care Baby Unit (SCBU)	Mothers whose infants were not admitted to neonatal unit, infants not preterm or low birth weight	mother* or maternal or women* low birth weight or preterm* or premature*
Exposure in context	Mothers' experiences, perspectives, in neonatal units, in the transitional phase between hospital and home, or at home after discharge from neonatal unit		
Outcomes	Data concerns experiences of feeding infants their own breast milk	Never provided their own breast milk to their infant, experiences of expressing breast milk, experiences of providing bank milk	experience* or perception* or perspective* or view* breast feed* or breastfeed* or breast milk or breastmilk or breast pump* or breastpump* or human milk or lactation* or lactating
Date	2008 to present	Prior to 2008	limit to yr="2008 -Current"
Study type	Qualitative studies, mixed-methods	Purely quantitative based studies, clinical case studies, reviews, theses, opinion pieces, grey literature.	ethnograph* or fieldwork or field work or focus group* or informant* or interview* or

			mixed method* or narration* or narrative* or open question* or participat* observation* or qualitative* or semi-structured or semistructured or thematic analys*
Language	English, Finnish, Swedish, and Norwegian published articles	Any other languages	limit to english or finnish or norwegian or swedish

Table 2. Study characteristics and quality appraisal of included studies.

Ref no.	Author Year	Aim	Country Type of unit(s)	Study design	Infants' GA /weight at birth	Sample	Age of infant or timing when the study was conducted	Parent characteristics (age/parity)	Data collection methods	Data analysis methods	QA Grade
42	Bjork et al. 2012	To illuminate mothers experiences of breastfeeding a preterm infant in a neonatal ward	Sweden One 10-bed neonatal unit	Qualitative	27-36 gw	12 mothers who were breastfeeding at discharge	At home, 2-7 months post-discharge.	22-40 yrs, 7 had university education	Written text by mothers asked to write about their experiences of breastfeeding	Thematic analysis	B
43	Boucher et al. 2011	To explore the maternal experience of breastfeeding initiation and progression in the NICU	Canada One level III NICU	Qualitative descriptive	27-34 gw	10 mothers who had begun to breastfeed	At hospital, 2-7 weeks old	24-35 yrs, 7 had a secondary education, half of the mothers were primiparous	Face-to-face interviews	Qualitative content analysis	B
45	Breivold et al. 2019	To explore mothers' experience after coming home from the hospital with a moderately to late preterm infant	Norway One unspecified neonatal unit	Qualitative explorative	30-35 gw	10 mothers	At home, 2-3 months after discharge	26-40 yrs, 8 Norwegian and 2 from Eastern Europe, 7 primiparous, 2 mothers with twins	Face-to-face interviews	Qualitative content analysis	A/B
44	Bujold et al. 2018	To explore whether mothers perceived expressing human milk for their infant in the NICU to be a closeness or separation experience and what factors gave rise to these perceptions	Canada One level III NICU	Qualitative descriptive	23-32 gw	15 mothers	At hospital, on average 37 days old at first data collection	26-44 yrs, 10 university education 10, primiparous, 10 Canadian citizens	By the "Happy-app", mother made voice recording where they described their experiences	Thematic content analysis.	A/B
30	Ericson et al. 2017	To explore mothers experiences of the proactive and reactive telephone support	Sweden Six NICUs	Qualitatively driven mixed-method evaluation	All < 37 gw with a mean GA of 34 gw	274 mothers provided written comments and 26 mothers were interviewed	At home, 8 weeks after discharge and at 6 and 12 months of infant age.	More than half had a university education, about 60% were primiparous, 6 % not born in Sweden	Written comments to open-ended questions on questionnaires issued at 8 weeks after discharge and at 6 and 12 months of age. Telephone interviews at 8 weeks after discharge and at 6 months of age	Thematic network analysis	B

31	Ericson and Palmér 2019	To describe how mothers of preterm infants in Sweden experience breastfeeding support during the first 12 months after birth	Sweden Six NICUs	Hermeneutic approach	< 37 gw with a mean of 34 gw	151 mothers; 125 provided written comments, 12 interviewed, and 14 gave comments and interviewed	At home, 8 weeks after discharge and at 6 and 12 months of infant age.	Mean age was 30, 60% had a university education, 60% primiparous, 15% had twins, 6 % not born in Sweden	Written comments to open-ended questions on questionnaires issued at 8 weeks after discharge and at 6 and 12 months of age. Telephone interviews at 8 weeks after discharge and at 6 months of age	Thematic network analysis	B
33	Flacking and Dykes 2013	To explore, in-depth, the impact of place and space on parents' experiences and practices related to feeding their preterm babies in NICUs in Sweden and England	England and Sweden 2 NICUs in each country	Ethnographic	23-35 gw	52 mothers; 22 Swedish and 30 English	At hospital, observations were made throughout the hospital stay	19-45 years, 30 primiparous, 6 were not born in Sweden/England	Participant observations (210 hours) and face-to-face interviews (96 hours)	Grounded theory	A/B
34	Flacking and Dykes 2017	To explore perceptions and experiences of using a nipple shield among parents and staff in neonatal units in Sweden and England	England and Sweden 2 NICUs in each country	Ethnographic	Median 31 gw	12 mothers	At hospital, observations and interviews were made throughout the hospital stay	8 primiparous, 3 mothers with twins	Participant observations and face-to-face interviews	Thematic network analysis	B
46	Holdren et al. 2019	To understand how differences in neonatal care culture in two units in Finland and the US were translated to parents' infant feeding experiences	Finland and the USA One level III NICU in each country	Unspecified qualitative	23-32 gw	15 mothers; 8 Finnish and 7 US mothers	In Finland: last week during the hospital stay, in the US: recently admitted to the NICU	20-44 years (mean 30), 6 mothers had twins	Interviews via telephone or face-to-face	Thematic narrative analysis	B/C
39	Ikonen et al. 2016	To describe maternal experiences of expressing breast milk for preterm or SGA infants.	Finland Internet-based	Descriptive	23-38 gw, mean of 31 gw	130 mothers	At home, 0-20 years (mean 4 years) of age	21-50 years (mean 34 years) 73% college or university degree, 23% twins or triplets, 58% previous breastfeeding experience	Open-ended questions in a web-survey	Qualitative inductive content analysis	B/C

40	Niela-Vilen et al. 2015	To describe the perceptions of breastfeeding mothers of preterm infants based on the postings in peer-support group discussions in social media.	Finland One level III NICU	Unspecified qualitative	Preterm infants	30 mothers of which 22 posted comments	At hospital and at home; 1st week post partum and then continuousl y during the first year	20-46 years (mean 29 years), 21 mothers were primiparous	Mothers posted comments on a secure FB page where only mothers who were recruited in a RCT could join. They accessed the FB group the 1 st week postpartum and could continue to access the group at least until the infant turned 1 year	Inductive thematic analysis	C
41	Niela-Vilen et al 2019	To describe maternal emotions regarding and insights into breastfeeding during the first year after a preterm birth.	Finland One level III NICU	Unspecified qualitative	25-35 gw	80 mothers	At infants' discharge (hospital), and at 3, 6 and 12 months corrected age	21-46 years (median 31 years), 73% had a polytechnic/ university education, 70% primiparous, 11 mothers had twins	Answers on open-ended questions at discharge, 3 and 6 months. Telephone interviews or short questionnaires at 12 months.	Inductive thematic analysis	B/C
32	Palmér and Ericson 2019	To describe mothers' experiences of breastfeeding their preterm infants from birth until 12 months after birth	Sweden Six NICUs	Unspecified qualitative	< 37 gw, median 34 gw	270 mothers	At home, 8 weeks after discharge and at 6 and 12 months of infant age.	Mothers had a mean age of 30 years, 51% had a university education, 59% primiparous and 32 mothers had twins	496 written comments to open-ended questions on questionnaires issued at 8 weeks after discharge and at 6 and 12 months of age.	Thematic network analysis	A
35	Parker et al. 2018	To examine the perceived barriers and facilitators of providing milk for very preterm infants during the hospitalization among Hispanic and non-Hispanic black mothers.	USA Two level III NICUs	Unspecified qualitative	24-37 gw median of 30 gw	23 mothers	At hospital and at home, when the infants were 2-18 months old	21-40 years, 12 Hispanic and 11 non-Hispanic mothers, 2 mothers with twins	Interviews	Grounded theory approach	B
36	Radtko Demirci et al. 2015	To describe the process of breastfeeding establishment among late preterm mother-infant dyads.	USA One level III NICU	Constructivist grounded theory	< 37 gw	10 mothers	At hospital 1-2 days after birth and then at home at 1, 2, and 6-8 weeks post partum	21-41 years, 7 had a college education, 5 primiparous, 2 mothers of twins,	Interviews with some mothers also contributing with e-mail or audioe diaries and video recordings with simulated recall interviewing	Grounded theory approach	B

37	Rossmann et al. 2011	To describe the experiences of mothers with VLBW infants who received lactation care from certified Breastfeeding Peer Carers with special preparation for NICU care.	USA One level III NICU	Qualitative descriptive	24-31 gw and VLBW 511- 1460 grams	21 mothers	At hospital 12-80 days after birth during NICU stay	18-41 years, 17 had some college education, 10 primiparous	Interviews	Content analysis	A
38	Rossmann et al. 2013	To describe the meaning of milk for mothers who were providing milk for their very low birth weight infants, hospitalised in the NICU	USA One level III NICU	Qualitative descriptive	23-33 gw and VLBW 600- 1445 grams	23 mothers	4-8 weeks of age	19-37 years, 5 had graduated from college education, 18 primiparous	Interviews and participant observations	Conventional (inductive) content analysis	A/B

Abbreviations: GA – gestational age; gw – gestational weeks; NICU – Neonatal Intensive Care Unit; VLBW – very low birth weight; SGA – small for gestational age

Table 3. Themes and subthemes linked to the individual papers

A positive breastfeeding experience – feeling attuned								
Themes	Trusting the body and what it can do			Being emotionally present – in the here and now		Experiencing mutual positive responses		
Subthemes	Trusting the body's capacity	Transferring goodness	Trusting the "how to"	Feeling relaxed	Feeling reassured	Seeing and interpreting the infant's cues	Responding to infant's cues	Seeing a positive response from the infant
Bjork et al., 2012 [42]	x		x	x	x	x	x	x
Boucher et al., 2011 [43]	x	x	x			x		x
Breivold et al., 2019 [45]		x	x	x	x			
Bujold et al., 2018 [44]	x	x	x					
Ericson et al., 2017 [30]			x		x			
Ericson and Palmér, 2019 [31]	x		x		x			
Flacking and Dykes, 2013 [33]	x		x	x	x	x	x	x
Flacking and Dykes, 2017 [34]			x	x	x	x	x	
Holdren et al., 2019 [46]		x	x	x		x	x	x
Ikonen et al., 2016 [39]	x	x						
Niela-Vilen et al., 2015 [40]	x	x	x	x		x	x	x
Niela-Vilen et al., 2019 [41]		x	x				x	x
Palmér and Ericson, 2019 [32]	x	x	x	x	x		x	

Parker et al., 2018 [35]	x	x						
Radtke Demirci et al., 2015 [36]	x	x	x			x	x	x
Rossman et al., 2011 [37]	x	x			x			
Rossman et al., 2013 [38]	x	x			x			

